$338\frac{1}{2}^\circ+27^\circ$ to $347^\circ+19\frac{1}{2}^\circ$, its radiant being very probably at $271^\circ+48^\circ$ near the head of Draco.

On August 14 the atmosphere was unusually clear, and during the four hours from about 10h. 15m. to 14h. 15m. I observed fifty-six meteors. The Perseid shower was still distinctly visible, and the meteors pretty bright. From seven accurately observed paths a very good radiant was obtained at $49^\circ + 57^\circ$. There was also a well-defined shower of streak-leaving meteors from Camelopardus at $61^\circ + 59^\circ$, and these, if confused with the Perseids, would have given the latter radiant a very diffused appearance. On this and the preceding nights I saw many Cygnids and Cepheids from radiants at $292^\circ + 53^\circ$ (sixteen meteors) and $311^\circ + 62^\circ$ (fourteen meteors), and this pair of showers formed by far the most important of the minor displays of the epoch. I had in previous years detected the Cygnids, but never remember to have seen the shower of Cepheids on such activity.

On comparison of my Perseid radiants deduced, on August 5, 8, 9, 10, 12, 13 and 14 it will be seen that they exhibit an easterly movement in satisfactory agreement with my observations in preceding years. This remarkable displacement of the radiant may now almost be regarded as "an old story" but it will always remain a very significant and interesting feature of the shower both from an observational and theoretical standpoint. The motion of the radiant amongst the stars may be nearly as easily and certainly observed by an experienced and precise observer as the motion of a comet. The circumstances are different of course, for a radiant is simply an apparent position and not a visible object, but trustworthy observations define this position with considerable exactness, though it is impossible to eliminate all the sources of error.

Mr. Corder, at Bridgwater, informs me that on August 10, before 14h. he counted 129 meteors, but he regarded the display as rather a poor one. The mean position of the radiant was at $44^\circ+57\frac{1}{2}^\circ$, but he considers that it shifted from $40^\circ+56\frac{1}{2}^\circ$ to $47^\circ+58\frac{1}{2}^\circ$ during his observation.

Mr. Corder, watching until 15h. on August 13, counted 77 meteors, but he says the Perseids had almost ceased, and gave an uncertain radiant, but such as it was could be located near the stars B and C Camelopardi. He found a very active and well-defined shower of Cygnids from the point $293^\circ + 50^\circ$.

W. F. DENNING.

CHOLERA AND ARTICLES OF DIET.

ALTHOUGH in by far the larger number of cases the distribution of cholera has been traced to the use of impure water, yet there are a few authentic instances on record of its dissemination by means of various articles of diet, such as milk, fruit, salad, whilst Kossel and Steyerthal quite recently report two cases (*Deutsche med. Wochenschrift*, 1892) in which its communication was traced to bread and butter. It becomes, therefore, not only of interest but importance, to ascertain what is the vitality of the cholera organism when purposely brought in contact either superficially or incorporated with various articles of food. Researches in this direction have been undertaken from time to time by various investigators, Babes, Celli and others, whilst Dunham's experiments published in the *Medical Record* for 1892 are amongst the most recent and exhaustive on this subject. This author found that cholera organisms purposely introduced on to salad leaves and placed in a covered dish and kept at the ordinary temperature of a room, retained their vitality for five days, on cooked cauliflowers for from six to ten days, and on the same vegetable uncooked for thirteen days. On a sliced strawberry they did not survive more than twenty-four hours.

Some important contributions to our knowledge of this subject have been made by Friedrich, and are brought together in an elaborate memoir, "Beiträge zum Verhalten der Cholerabakterien auf Nahrungs und Genussmitteln" published in the *Arbeiten a. d. Kaiserlichen Gesundheitsamte*, vol. viii. 1893, p. 465.

The range of materials investigated is very extensive, upwards of fifty different articles being specially studied in this respect, including numerous kinds of fruit, several vegetables, besides milk, tea, coffee and cocoa, also particular descriptions of beer and wine, whilst amongst the miscellaneous materials examined may be mentioned caviar, biscuits, bonbons, tobacco, and snuff!

In the majority of cases the bacilli were not only rubbed on to the surface of the various fruits and vegetables, but were also inoculated on to slices, so that the effect on the bacillus of the *composition* of a particular fruit or vegetable could be ascertained. When simply exposed on the exterior of a given material, the vitality of the bacillus depends chiefly on the degree of moisture which is present in its environment, this organism being specially characterised by its rapid destruction in dry surroundings, but when brought in contact with the juices it is the proportion of fruit acid and sugar present which primarily determine its behaviour. The cholera bacilli are very sensitive to acid, and hence their destruction on most slices of fruit in from one to six hours.

Thus when inoculated on to slices of bright red very juicy and sour cherries, the bacilli were annihilated in three hours, whilst when simply rubbed on the surface and kept in a moist atmosphere they were still alive at the end of five days. On the other hand, when thus treated and exposed to the ordinary air of a room, the bacilli could not be found after twenty-four hours, whilst when placed in the direct sunshine their vitality was limited to one hour and a half.

But even on slices of fruit containing a much smaller amount of acid, such as pears, the vitality of the cholera organism was not much prolonged, and the reason for this must be sought in the fact that, when grown in solutions containing sugar, this organism produces acid, and the acid thus produced impedes its further development and destroys its vitality.

On vegetables such as cucumbers, cauliflowers, cabbages, the cholera bacillus maintains its existence for several days; thus on spinach leaves preserved in a damp atmosphere, the bacilli were still present after twelve days, and even when exposed to the ordinary air of a room they did not disappear until after six days.

As regards the behaviour of the cholera organisms in tea it is interesting to note that in a 3 per cent. infusion of black Chinese tea they are destroyed within twenty-four hours, whilst in a 4 per cent. infusion no trace of them could be found at the end of sixty minutes.

Friedrich has confirmed the results of other investigators on the bactericidal properties of coffee, finding two hours' immersion in a 6 per cent. infusion of this material sufficient for the destruction of these organisms.

In various kinds of beer, Munich, Pilsener, and Lager, they could not survive more than from one to three hours, but still more rapid was their extinction in white and red wine, for five minutes after their introduction they could no longer be found in the former, whilst in the latter their vitality did not exceed twenty minutes.

From the numerous investigations recorded it is obvious that during any epidemic of cholera the consumption of uncooked fruit and vegetables should be avoided, or that at any rate precautions should be taken to ensure their sterility by careful cleansing or by the removal of the rind or skin where possible.

G. C. FRANKLAND.

NOTES.

MEN of science throughout the world will be glad to know that the honour of knighthood has been conferred upon Dr. Joseph Henry Gilbert, F.R.S., who has been associated for more than fifty years with Sir J. B. Lawes in the agricultural experiments conducted at Rothamsted. British and foreign academies and learned societies have long recognised Dr. Gilbert's claims to distinction, and have bestowed upon him various marks of approval. We are glad now to be able to record that his scientific work has been officially recognised.

Prof. Max Muller has received from the Sultan of Turkey the gold medal of the Order of Merit, the highest honour in the Sultan's gift.

Zoologists will learn with regret that Mr. George Brook, lecturer on embryology to the University of Edinburgh, died suddenly at Newcastle on Saturday night last. His death is a loss to zoology and to those who knew and appreciated him.

The *Times* announces the death of Rear-Admiral T. A. Jenkins—one of the ablest officers of the U.S. Navy—at the age of eighty-two. In 1846 he prepared a report on the lighthouse systems of Great Britain and the continent. Shortly afterwards he assisted Prof. Bache in making some meteorological and hydrographical observations, and in determining deep-sea temperatures in the Gulf Stream, the vessel in which the investigations were carried on being built under his supervision. In 1852 he was appointed naval secretary of the Lighthouse Board, and from 1869 to 1871 was secretary of the Board. He was also for some time Chief of the Bureau of Navigation.

The Franklin Institute has awarded a medal and a premium of twenty dollars, in accordance with the legacy of John Scott, of Edinburgh, to each of the following gentlemen:—Dr. Adolph Frank, Charlottenburg, Germany, for a composition of infusorial earth as adapted for filtering purposes; Frank Reddaway, Manchester, for his invention of camel-hair belting; Henry L. Bridgman, Blue Island, Illinois, for his invention of an ore sampling machine; and S. H. La Rue, Trenton, N.J., for his improvements in stoves. An Elliot Gresson medal has been awarded to Frederick E. Ives, Philadelphia, for his system of colour photography known as heliochromy. Any objections to these awards, or evidence of want of originality of the inventions named, should be lodged with the secretary of the Institute before October.

A Reuter's telegram, dated August 11, reports that a violent shock of earthquake was felt on the previous evening in the small coast town of Mattinata. It was followed during the night by other shocks of less violence, which were felt also at Monte Sant', Angelo, Manfredonia, and Rodia—all towns on the shores of the Adriatic. Later information states that all the buildings in Mattinata were more or less seriously damaged by the earthquake, and great cracks were caused in the walls of the houses. Three persons were killed and four injured, while others were shaken or bruised. The island of Stromboli experienced a sharp shock, followed by an unusually violent eruption of the volcano.

The Iron and Steel Institute will hold its twenty-fifth autumn meeting at Darlington, from September 26 to 28 inclusive, when several important papers will be read. Prof. Roberts-Austen, F.R.S., will contribute a paper on the influence of the rating of the rupee on the world's iron trade; Mr. H. Bauerman will discourse on the "Metallurgical Exhibits at the World's Fair"; and Mr. Kupelwieser will communicate a paper on the recent developments of the steel industry in Austria. A number of other subjects of technical interest will also be discussed. The members will have the advantage of visiting the numerous iron and steel works in the vicinity of Darlington, and arrangements have been made for excursions to Barnard Castle and Raby Castle.

The Board of Agriculture have been requested to draw the attention of fruit growers to an international exhibition, to be held by the Russian Society of Fruit Culture, under the patronage of the Czar, at St. Petersburg, in the autumn of 1894, with the object of showing the present condition of the cultivation of fruit and vegetables, of viticulture, of the cultivation of various special plants, and the manufacture of their products. A congress of pomologists will be convened simultaneously with the exhibition. The exhibition will comprise sections dealing, among other matters, with horticulture implements and appliances, and technicality of production, and also literary, scientific, and educational accessories, collections, plans, &c. Detailed regulations of the exhibition and programmes of the various competitions will be published and distributed towards the end of this year. Persons interested in the progress of horticulture and pomology, both in Russia and other countries, are invited by the Russian Government to take part in this international exhibition and congress. Applications for further information should be addressed to the offices of the International Exhibition of Fruit Culture, Imperial Agricultural Museum, Fontanka 10, St. Petersburg.

Serious floods have occurred in Galicia (says Reuter's agency) and they are exceeded in their gravity by disastrous inundations which have visited Saras and Ung, two northern countries of Hungary. The damage done in these districts is immense, and there has been serious loss of life. According to the latest accounts, the waters are now receding. Dispatches from Lemberg describe the havoc that has been wrought in the valleys beneath the Carpathians by the persistent rainfall. The rivers Dniester, Stryi, San, and Dunajec have overflowed their banks, causing great damage, especially in the districts of Zydaczow, Stryi, Przemysl, and Rimanow. At Turka twenty-two houses have been destroyed by the floods or struck by lightning, and many persons lost their lives.

During the past week the heat has been excessive in the midland and southern parts of England; it reached or exceeded 80° at Greenwich Observatory on eight successive days from the 8th instant, which is the longest period this summer during which such high temperatures have been recorded. On Wednesday, the 9th instant, and on Monday and Tuesday last, the temperature exceeded 85° in several places, and reached 89° in the neighbourhood of London on the latter day. On the 9th and 10th this exceptional heat culminated in severe thunderstorms in most parts of the country; in Ireland the storms and rainfall were very heavy, the amount of rain measured in the north of Ireland during the week ended the 12th instant being ·8 inch above the average. The heat on the continent has been much greater than in this country; the shade maximum at Rochefort in France reached 106° on Monday last.

Dr. W. Doberck has communicated to *Hansa* of July 29 and August 5 an interesting article on the typhoons of the China Sea, a subject of which he has made a special study, and for the collection of the necessary materials his position as director of the Hong Kong observatory offers many advantages. So long ago as September, 1886, he communicated to the *Hong Kong Telegraph* a paper on the law of storms in the Eastern Seas. The present article embodies the facts there set forth so far as they relate to the subject in question, together with the results of the experience subsequently gained. The typhoons, like the hurricanes of the West Indies and other parts, generally give premonitory signs, such as the motions of cirrus clouds, the swell of the sea, and motion of the barometer, but there appears to be some difficulty in determining whether depressions will result in ordinary gales or in typhoons, and it is essential to determine quickly how a ship lies with respect to the advance of the centre of the disturbance. In these and other details which are of primary importance to the seaman navigating the China Seas, the information contained in the paper will be very useful.

THE report of the chief of the United States Weather Bureau for the year 1892 has recently been received, and shows that much attention has been given to the improvement of weather forecasts, the result being a success of 82·9 per cent. in the combined predictions of weather and temperature for twenty-four hours in advance. Until recently the issue of predictions was restricted to the Washington office, but now a number of competent observers make forecasts for their immediate vicinity. In order to render this service as efficient as possible, telegraphic reports are received when considered necessary from several of the West Indian islands. Various important investigations have recently been published, and at present the subject of the rainfall of the entire country is under discussion. The policy of the Bureau favours the establishment of high-level stations, and the observatory at Pike's Peak has been reopened; advantage has also been taken of one or two balloon ascents to obtain observations made in free air. Every effort is being made to advance the science of meteorology; the entire territory of the United States is now covered by local weather services with the exception of Alaska, and the weekly and monthly reports issued by them contain tables of meteorological data and discussions of great value to immigrants, invalids and to men of science generally. The *Monthly Weather Review*, issued by the Central Bureau, is a highly creditable work, prepared from the reports of upwards of 2600 observers. We also observe that frequent applications are made to the Bureau for climatological statistics, and that these are generally satisfied without expense to the applicants. The number of such applications during the year amounted to over 500; this fact alone is sufficient to show the liberal policy of the Bureau.

SOME elaborate investigations on the disinfecting powers of hypochloride of soda, chloride of lime, and peroxide of hydrogen have been recently published by Chamberland and Fernbach in the *Annales de l'Institut Pasteur*, June, 1893. When these materials were employed at a temperature of from 40–50° C. and higher, their action was invariably more rapid than when they were used at the ordinary temperature, thus affording a striking confirmation of Heider's experiments on the greater efficiency of disinfectants at higher temperatures, reference to which was made in NATURE for June 15. Micro-organisms in dry surroundings were found far more capable of resisting the action of these disinfectants than when exposed in a moist condition, that whereas in the latter case they were destroyed in a few minutes, in the former they defied an exposure of several hours, even to hot disinfectants. If, however, such dried germs be subjected to one hour's immersion in water they lose their power of resistance, for on the subsequent application of the disinfectant they succumb rapidly. These authors insist, therefore, on the importance of first spraying the walls of a room with water before commencing their disinfection. In conclusion a solution of chloride of lime (prepared by extracting one part of chloride of lime with ten parts of water and diluting the clear extract with ten times its volume of water) is recommended as an exceedingly efficient as well as economical disinfectant for practical purposes.

AN interesting example of the degree of resistance to high temperatures exhibited by some micro-organisms has lately been published in the *Centralblatt für Bakteriologie*, May 17, 1893. Whilst preparing nutritive gelatin-peptone in the usual manner, Heim found that, despite all precautions of sterilisation &c., numerous yellow or reddish-yellow centres subsequently appeared in the culture material. On isolating out these colonies and further studying them, these growths were ascertained to be derived from two spore-producing bacilli which had resisted the usual 10–20 minutes' exposure to steam on three successive days. On further studying these organisms it was found that one of them required three hours' continuous steaming before being destroyed, whilst the other was not annihilated until this had been prolonged for seven hours. These extremely hardy spores were traced to the leaf-gelatin employed, and as in many respects they resembled certain soil-microbes, Heim supposes that in some manner or other during its preparation the gelatin must have come in contact with soil. Still more recently a cladothrix has been found in water which, on account of its ability to resist high temperatures has been called *Cladothrix invulnerabilis* (*Centralblatt f. Bakteriologie*, vol. xiv. p. 14). It was still endowed with vitality after having undergone six successive exposures to ordinary intermittent sterilisation at 100° C.

M. LOUIS BOUTAN has succeeded in taking submarine photographs under various conditions, by a method described in the *Comptes Rendus*, No. 5. A camera constructed for several successive exposures was enclosed in a metal box provided with plane-parallel glass windows mounted in copper rings. The apparatus was mounted on a heavy stand provided with weights, so as to give it a steady footing on the sea bottom. Near the shore, in depths not exceeding 1 or 2 m., the camera could be placed in position without the necessity of the observer entering the water, and negatives were obtained by direct sunlight in about 10 minutes. With an exposure of 30 minutes negatives could be obtained at depths of 6 or 7 m., the apparatus being put up by a diver. The best images were obtained by placing a blue glass in front of the lens, but even the best showed a want of depth which could only be relieved by using a very small diaphragm. This difficulty would disappear if the lenses were adapted to submarine work to begin with. Pictures of the sea-bottom were also obtained instantaneously during a storm by means of a flash-light, consisting of an alcohol lamp fed by a reservoir of oxygen. Magnesium powder was projected into the flame by pressing a rubber ball. The depth at which these photographs can be taken is at present limited to that which can be attained by the diver.

THE absorption of light by platinum at different temperatures is discussed in a highly interesting paper recently communicated to the Accademia delle Scienze di Torino by Dr. G. B. Rizzo. He succeeded in obtaining transparent films of platinum produced under such conditions as to exclude the possibility of oxidation on raising the temperature. The apparatus employed consisted of two glass cylinders joined by a thin tube. Another tube was soldered to the middle of the latter, and connected with an air-pump and a reservoir containing nitrogen. The tubes were filled with nitrogen several times, and exhausted, so as finally to contain a rarefied atmosphere of nitrogen. One of the platinum electrodes was partly encased in glass, and connected with the negative pole of a Rhumkorff coil excited by six Bunsens, the other electrode being connected to the positive pole. Under these conditions the negative pole was volatilised and deposited as a thin film upon the walls of the glass cylinder containing the electrode. The glass cylinder was then disconnected by filling the apparatus with nitrogen to atmospheric pressure, melting the thin tube under the blowpipe, and drawing it out to a rod to be broken off. The platinum electrode was bent out of the way by melting its glass sheath, and the result was a cylinder of glass containing a fine deposit of platinum and filled with nitrogen. This cylinder was placed in an iron cylinder in a small gypsum furnace, and heated by a spiral tube of small gas jets. Light was transmitted through windows in the iron tube, and a Krüss universal spectroscope was used to compare the spectra transmitted through the glass and platinum, and through the glass only. The temperatures were measured by the calorimetric method. After allowing for the various reflections undergone by the light, it was found that as the temperature increased, the transparency of the film increased, especially in the more refrangible region. It may be added that this phenomenon, if found to hold generally, establishes a new correlation between light and electricity, the increase of electrical resistance of a conductor being accompanied by an increase of transparency.

THE alternate current supplied by the Innsbruck Central Station has been utilised by Dr. G. Benischke for the purpose of investigating the dielectric constants of some solids by the method of Gordon as improved by Lecher. This current charged the condenser positively and negatively at equal intervals, thus avoiding residual effects of all kinds. In order to obtain greater sensitiveness the alternate current was transformed to higher differences of potential by means of an induction coil. It was found that the dielectric constant is independent of the strength of the field in the condenser, and hence also that there exists no perceptible conductivity in the dielectric. The constant of paraffin was found to be 1·89, of ebonite 2·03, of sulphur 2·42, of common glass 4·17 to 4·52, of plate-glass 3·85.

WE have received the supplement to the calendar of the Royal University of Ireland for the year 1893. It contains the papers set at the University's examinations during 1892.

THE report of the fourth meeting of the Australasian Association for the Advancement of Science, held at Hobart Town, Tasmania, in January, 1892, has just reached us. It is edited by Mr. A. Morton.

THE *Midland Naturalist* contains an address delivered by Mr. W. H. Wilkinson, President of the Midland Union of Natural History Societies, on "The Life-History of the Diamond-Back Moth" (*Plutella cruciferarum*). We note that at the annual meeting of the Union on July 11 it was decided to discontinue the publication of the journal.

MESSRS. CROSBY LOCKWOOD AND SON will shortly publish "The Miner's Handbook," compiled by Prof. Milne, F.R.S., of the Imperial University of Japan. The volume is of especial interest on account of the fact that it is being printed under the author's direction at Tokio.

A CORRESPONDENT, "H. K. R.," writing from Victoria, Australia, with regard to a letter in our issue of March 30, refers us to another and in some respects simpler rule for finding the day of the week which corresponds to any given day of the year, to be found in Dr. Charles Hutton's "Mathematical Recreations," published in London in 1803.

THE U.S. Department of Agriculture has just issued a systematic and alphabetic index to new species of North American Phanerogams and Pteridophytes published in 1892, by Miss Josephine A. Clark. The index forms the seventh number of the third volume of contributions from the U.S. National Herbarium.

DR. MCALPINE has prepared a report for the Victoria Department of Agriculture on a poisonous species of Homeria found near Melbourne, causing the death of cattle feeding upon it. The species is *Homeria collina*, Vent.—var. *Miniata*, commonly known as Cape Tulip. There is evidence that it is fast spreading over the Colony, and strenuous measures will have to be taken to eradicate it.

WE have received the following excerpts from the Proceedings of the United States National Museum: Catalogue of the crabs of the family Maudæ in the U.S. National Museum; list of Diatomaceæ from a deep-sea dredging in the Atlantic Ocean off Delaware Bay, and scientific results of explorations, by the U.S. Fish Commission steamer *Albatross;* also notes on Erian (Devonian) plants from New York and Pennsylvania.

THE Memoirs and Proceedings of the Manchester Literary and Philosophical Society (vol. vii. No. 2) contains the second part of Prof. W. C. Williamson's General, Morphological, and Histological Index to his collective memoirs on the Fossil Plants of the Coal Measures. Prof. Harold B. Dixon, F.R.S., contributes a long paper on the "Rate of Explosions in Gases," and in collaboration with Mr. B. Lean, one on the "Length of Flame Produced by the Explosion of Gases in Tubes."

A COPY of Prof. C. V. Riley's presidential address of "Parasitism in Insects," delivered before the Entomological Society of Washington in 1892 has just reached us. It goes to show that "the parasitic forms and the parasitic habit have appeared late in the history of insect evolution on the globe" A number of papers by Prof. Riley on various entomological subjects have also been received. Among them is one on the habits and natural history of the Ox Bot-fly, *Hypoderma bovis*, in the United States. This has hitherto been supposed to be the common species of both America and Europe, but Prof. Riley finds that the species has not been observed and recorded in North America, hence he considers its presence as merely conjectural. The American species is *Hypoderma lineata*, Villiers, and it seems probable that when the life history of the European *H. bovis* has been worked out it will be found to coincide with the American Bot-fly as described by Prof. Riley.

A NEW mineral of exceptional interest, inasmuch as it contains about six and a half per cent. of the extremely rare element germanium, is described by Prof. Penfield, of the Sheffield Scientific School, U.S., in the August number of the *American Journal of Science*. Germanium was discovered in the year 1886 by Prof. Winkler in the Freiberg mineral *argyrodite*, a double sulphide of silver and germanium. The remarkable manner in which the new element was found to correspond with the *ekasilicon* predicted by Prof. Mendeleëff will be still fresh in the minds of chemists. Germanium thus belongs to the fourth or tetravalent vertical group of the periodic classification, occupying the space previously vacant between silicon and tin vertically and gallium and arsenic horizontally. Its atomic weight of 72·3 corresponds almost exactly with the number assigned to the missing *ekasilicon* by Prof. Mendeleëff. The occurrence of this interesting element appears, as far as the writer can gather, to have been noticed previously in only one other mineral specimen besides *argyrodite*, namely, in *euxenite* by Prof. Krüss, two years after its discovery in the former mineral. Since that time Prof. Winkler has prepared a large number of its compounds and from time to time described their properties, so that we now possess a considerable amount of information concerning germanium. The third mineral now announced was brought from Bolivia by Mr. Canfield as a new, rich, and very beautiful silver ore, and submitted to Prof. Penfield for examination. It has been termed *canfieldite* in honour of its finder. The presence of germanium was suspected from its behaviour when heated in closed and open tubes and on charcoal, inasmuch as it much resembled the behaviour of *argyrodite* under similar circumstances. Perhaps the most remarkable characteristic of germanium is that it forms a *white* sulphide, GeS_2. On heating *canfieldite* in a closed tube the sublimate of sulphide was observed to be white, and, moreover, when the mineral is heated on charcoal a white sublimate of oxide and sulphide is produced near the residual bead of metallic silver, together with a number of milk-white semi-transparent fused globules characteristic of germanic oxide, GeO_2. Eventually most of the compounds of germanium were prepared from the mineral and their properties found to correspond in all respects with those described by Prof. Winkler. A sulpho-salt soluble in solutions of caustic alkalies like the sulphosalts of tin, antimony, and arsenic was obtained, and the alkaline solution yielded a precipitate of the white sulphide upon the addition of a dilute acid. When this sulphide, GeS$_2$, was heated in a current of hydrogen, small glittering scales of the lower sulphide, GeS, much resembling crystals of specular iron ore, were formed just beyond the heated portion of the tube; upon continued heating complete reduction occurred, metallic germanium itself being deposited upon the walls of the tube in small greyish-white octahedral crystals which exhibited a particularly brilliant metallic lustre.

Canfieldite, upon analysis, yields numbers which indicate that its composition is Ag$_8$GeS$_6$, or 4Ag$_2$S.GeS$_2$. Prof. Penfield points out that the published analysis of Prof. Winkler's for *argyrodite* agrees much better with the same formula than with the formula 3Ag$_2$S.GeS$_2$, which he ascribes to it in his memoir. Prof. Penfield confirms this by another analysis of *argyrodite* conducted with an excellent specimen in his possession. The two minerals would thus appear to possess the same composition. They are not identical, however, for *argyrodite* crystallises in the monoclinic system. *Canfieldite* crystallises in cubic octahedrons modified by dodecahedral faces; the crystals are black with a blue or purple sheen, they exhibit a magnificent metallic lustre and are extremely brittle. *Argyrodite* and *canfieldite* are therefore dimorphous forms of silver germanium sulphide.

Notes from the Marine Biological Station, Plymouth.—Last week's captures include the Hydroid *Myriothela phrygia*, the semi-parasitic Rhabdocœle *Fecampia erythrocephala*, and the Mollusca *Favorinus albus* and *Rostanga coccinea*. The floating fauna has changed very slightly since last week, but several other autumn forms have made their appearance. Radiolaria have been present in fair numbers; the Anthomedusa *Podocoryne* (= *Dysmorphosa*) *carnea* has been plentiful, the majority possessing buds upon the manubrium; and the beautiful larvæ of the Prosobranch *Rissoa* and of the Opisthobranch *Ægirus punctilucens* have also been taken. The Turbellaria *Fecampia erythrocephala* and *Cycloporus papillosus*, and the Crustacean *Hyas coarctatus* are now breeding.

The additions to the Zoological Society's Gardens during the past week include two Ruffed Lemurs (*Lemur varius*, ♂ ♀) from Madagascar, presented by Mrs. Brightwen; three Long-eared Owls (*Asio otus*) and one Tawny Owl (*Syrnium aluco*) from Europe, presented by Mr. Edmund Hart, F.Z.S.; a —— Falcon (*Falco* ——) from ——, presented by Lord Lilford, F.Z.S.; five shags (*Phalacrocorax graculus*) from Scotland, presented by the Maclaine of Lochbuie; a Common Chameleon (*Chamæleon vulgaris*) from North Africa, presented by Mr. E. Palmer; a Black-headed Caique (*Caica melanocephala*) from Demerara, deposited; a Regent Bird (*Sericulus melinus*) from Australia, purchased.

OUR ASTRONOMICAL COLUMN.

The Origin of New Stars.—Prof. A. W. Bickerton writes to us from Christchurch, New Zealand, as follows:—"More than a year has elapsed since the first notice appeared of the new star in Aurigæ, and up to date no generally-accepted explanation of the special phenomena noted has been offered in any of the leading journals. May I beg to draw the attention of your readers to several articles bearing directly upon the mode of origin of new stars, published fifteen years ago in the Transactions of the N.Z. Institute? The explanation there offered appears to fit in almost exactly with the actual conditions as observed in this particular case. The papers referred to are contained in vols. 11, 12, and 13 of the Transactions of the N.Z. Institute. A summary of these papers also appears in the Proceedings of the Australasian Association for the Advancement of Science for the year 1891." Upon referring to the above references we find that Prof. Bickerton believes that new stars are caused by the "grazing" collision of stars like the sun. His researches show that "The temperature developed is independent of the amount of grazing. With similar substances it depends only on the velocity destroyed, so that the coalesced body produced by the merest graze must be as hot as though the whole sun collided. The molecular velocity of such a high temperature may be sufficient to carry away every particle entirely into space, the mass of the body not having sufficient attractive power to retain them. Hence an intensely brilliant body is produced in less than an hour; it then expands and increases in size and total luminosity for perhaps a few hours to a day or so; then the diffusion would be so great as to gradually lessen luminosity, until in a few months or a year the star would have disappeared into space. This represents all the peculiarities of temporary stars. If the graze be more considerable the attraction will be greater, yet the molecular velocity is the same: a hollow globe of gas may then result, giving us a planetary nebula. According to Lord Lindsay this is the condition of the temporary star in the Swan."

The Spectrum of the Rordame-Quénisset Comet.—Prof. Campbell in *Astronomische Nachrichten*, No. 3177, gives a detailed account of the visual and photographic observations that he has made of the spectrum of this comet at the Lick Observatory. The following are the visual observations, and in the fourth column are given Kayser and Runge's wave-lengths for the edges of carbon bands.

July 11.	July 12.	July 17.	Carbon bands.	Description of bright lines and bands.
600	601	—	619·595	Maximum of red band, broad, faint.
562	—	—	563	Red edge of yellow band.
—	—	5633	5635	Very faint line terminating in yellow band.
—	—	558	5585	Bright line in yellow band.
5162·1	5161·8	5163·9	5165·2	Very bright line terminating in green band.
5124	5127	5128	5129	Very bright line terminating in green band.
—	—	509	—	Very bright line terminating in green band.
4734	—	—	4737	Red edge of blue band.
—	—	4734	4737	Bright line terminating blue band.
—	434	—	—	Bright region in continuous spectrum, faint.
—	421	—	—	Bright region in continuous spectrum, faint.

In addition Prof. Campbell has obtained two photographs of the comet-spectrum extending from wave-length 487 to 387. Twenty-eight bright lines have had their positions determined in the photographic spectrum, fourteen of which appear to correspond to lines and bands of carbon and cyanogen as given by Kayser and Runge. It is pointed out, however, that the wave-lengths of the comet-lines are systematically less than Kayser and Runge's by one or two tenth-metres. Prof. Campbell thinks this may in part be due to the fact that the cometary spectrum consists of unsymmetrical bands rather than lines, and partly to motion in the line of sight.

Atmospheric Refraction and Star Photographs.—Now that stellar parallax is determined from photographic data, and a catalogue of stars is being prepared from the images impressed by celestial points upon sensitive films, it becomes necessary to investigate the effect of each and every cause tending to vitiate the results. Prof. A. A. Rambaut considers the most important of these disturbing causes in a paper on the distortion of photographic star images due to refraction read before the Royal Dublin Society on April 19, and just published in a separate form. Prof. Rambaut had previously published formulæ (*Astr. Nach.* 3125), by which the correction for refraction to the relative position of any two stars on a photographic plate can be computed in a convenient manner, and he has now followed these up by determining the distortion that takes place in the shape of a star-image during the exposure. His conclusion is that within the limits of an exposure of fifteen minutes' duration, "so long as the zenith distance does not exceed 60° no sensible error can arise through the distortion of a star by refraction if the measures are in all cases made from the centre of the image, and the coefficients in the formulæ of reduction are computed for the time corresponding to the middle